

**Declaration of ISHAM M. REAVIS**  
**pursuant to 28 U.S.C. § 1746**

I, Isham M. Reavis, declare as follows:

1. I am a law student performing work on this case as part of an internship with the Federal Trade Commission ("FTC"). My internship is located in the FTC office at 915 Second Avenue, Suite 2896, Seattle, WA 98174. If called as a witness I could and would competently testify regarding the contents of the following statements, which are based on my personal knowledge.

2. I was assigned to research existing medical literature on the Internet to find any articles or studies showing a link between regular colon cleansing through laxative use and an increased or decreased risk of colon cancer. To conduct this research, I searched various Internet databases that report medical information, including Healthfinder.gov, MedlinePlus.gov, the Mayo Clinic, PubMed, and medical databases available through Lexis using the keywords "colon cancer," "colorectal cancer," and "laxative."

3. I searched PubMed<sup>1</sup> on April 1, 2011, using the keywords "cancer" and "colon cleansing." This search returned the citation and abstract for T. Watanabe, N. Nakaya, K. Kurashima, S. Kuriyama, Y. Tsubono & I. Tsuji, *Constipation, laxative use and risks of colorectal cancer: The Miyagi Cohort Study*, 40(14) Eur. J. Cancer 2109 (2004) ("*The Miyagi Cohort Study*"), a true and correct copy of which is attached to this declaration as **Attachment A**. I purchased the article by following the link provided.

4. *The Miyagi Cohort Study* analyzed data obtained from over forty-thousand individuals, aged 40–64, over a seven-year period. (Attach. A at 1, Watanabe et al., *supra*, at 2109.) *The Miyagi Cohort Study* reports that subjects who were laxative users experienced an increased relative risk of colon cancer. (Attach. A at 3, Watanabe et al., *supra*, at 2111.) The increase in relative risk was found more pronounced when comparing regular laxative users (twice a week or more) to individuals who did not report using laxatives. (Attach. A at 3, Watanabe et al., *supra*, at 2111.) *The Miyagi Cohort Study* concluded that these results support the hypothesis that

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<sup>1</sup> [Http://www.ncbi.nlm.nih.gov/entrez/query.fcgi](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi).

1 constipation or laxative use increases the risk of colon cancer. (Attach. A at 6, Watanabe et al.,  
2 *supra*, at 2114.)

3 5. I searched the Lexis Full-Text Medical Journals database<sup>2</sup> on April 1, 2011, using the  
4 keywords "colon cancer" and "laxative." The search returned the full text of Gabriel A. Kune,  
5 Susan Kune, Barry Field & Lyndsey F. Watson, *The Role of Chronic Constipation, Diarrhea,*  
6 *and Laxative Use in the Etiology of Large-Bowel Cancer; Data from the Melbourne Colorectal*  
7 *Cancer Study*, 31 Diseases of the Colon & Rectum 507 (1988) ("*The Melbourne Study*"), a true  
8 and accurate copy of which is attached to this declaration as **Declaration B**.

9 9. *The Melbourne Study* analyzed all confirmed new cases of colorectal adenocarcinoma  
10 within a twelve-month period diagnosed in residents of Melbourne, Australia. (Attach. B at 1.)  
11 Melbourne had a population of 2.81 million during the time in question. (*Id.*) It found no  
12 statistically significant difference in the distribution of laxative use between colorectal cancer  
13 patients and cancer-free individuals. (*Id.* at 4.) It noted previous studies had also failed to find  
14 evidence of this correlation. (*Id.*) *The Melbourne Study* concluded that laxative use is most likely  
15 not associated with the risk of colorectal cancer. (*Id.*)

16 10. I searched MedlinePlus<sup>3</sup> on April 1, 2011, using the keywords "colorectal cancer" and  
17 "laxative." I followed the link supplied to Mary Jane Schier, *Clean Your Colon Health or Hype?*,  
18 Focused on Health (March 2010), [http://www.mdanderson.org/](http://www.mdanderson.org/publications/focused-on-health/issues/2010-march/clean-your-colon-colon-health-cleanse.html)  
19 [publications/focused-on-health/issues/2010-march/clean-your-colon-colon-health-cleanse.html](http://www.mdanderson.org/publications/focused-on-health/issues/2010-march/clean-your-colon-colon-health-cleanse.html)  
20 (visited Apr. 4, 2011) ("*Health or Hype*"), a true and correct copy of which is attached to this  
21 declaration as **Attachment C**.

22 11. *Health or Hype* was published by the Public Education Office of the University of Texas  
23 MD Anderson Cancer Center. Focused on Health,  
24 <http://www.mdanderson.org/publications/focused-on-health/about-focused-on-health/index.html>.

25 <sup>2</sup> [https://www.lexis.com/research/form/search?\\_m=f084db6875c057b983370a0bca01b157&\\_](https://www.lexis.com/research/form/search?_m=f084db6875c057b983370a0bca01b157&_src=153508.3006605&_cat=3006605&wchp=dGLbVlW-zSkAA&_md5=22ccd4734e121766cc1a836d917de296)  
26 [src=153508.3006605&\\_cat=3006605&wchp=dGLbVlW-zSkAA&\\_md5=22ccd4734e121766cc1a836d917](https://www.lexis.com/research/form/search?_m=f084db6875c057b983370a0bca01b157&_src=153508.3006605&_cat=3006605&wchp=dGLbVlW-zSkAA&_md5=22ccd4734e121766cc1a836d917de296)  
27 [de296](https://www.lexis.com/research/form/search?_m=f084db6875c057b983370a0bca01b157&_src=153508.3006605&_cat=3006605&wchp=dGLbVlW-zSkAA&_md5=22ccd4734e121766cc1a836d917de296).

28 <sup>3</sup> Available at <http://www.medlineplus.gov>.

1 *Health or Hype* reported that no evidence exists showing that colon cleansing, including the use  
2 of laxatives or natural products with laxative properties, prevents disease or improves health.  
3 (Attach. C at 1.) Specifically referring to colon cancer, *Health or Hype* quotes Dr. John R.  
4 Stroehlein, a professor of gastroenterology at the University of Texas, as stating that there is  
5 “absolutely no evidence that colon cleansing can prevent the disease[.]” (*Id.*)

6 12. My April 1 search of MedlinePlus also returned a link to National Eating Disorders  
7 Assoc., *Laxative Abuse: Some Basic Facts* (2005), available at  
8 <http://www.nationaleatingdisorders.org/nedaDir/files/documents/handouts/Laxative.pdf> (visited  
9 Apr. 4, 2011) (“*Basic Facts*”), a true and correct copy of which is attached to this declaration as  
10 **Attachment D.**

11 13. *Basic Facts* warns that laxative abuse—defined as repeated, frequent misuse of  
12 laxatives—may cause organ damage and contribute to an increased risk of colon cancer. (Attach.  
13 D.) “[L]axative abuse is **serious and dangerous**—often resulting in a variety of health  
14 complications and sometimes causing life-threatening risks.” (*Id.* (emphasis in original).)

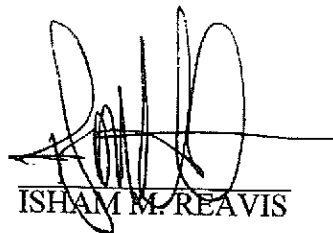
15 14. I was unable to find in my research any article or reference that supports the proposition  
16 that colon cleansing or laxative use in any way decreases the risk of colon cancer.

17 15. Though *The Melbourne Study* found no evidence of increased risk of colon cancer  
18 associated with laxative use, (Attach. B at 4), both that study and *Health or Hype* indicate that  
19 there is no decrease in colon cancer risk due to colon cleansing. (*See Id.*; Attach. C at 1.) *Health*  
20 *or Hype* specifically aims to debunk claims that colon cleansing produces any beneficial health  
21 effects, stating that “[d]espite countless ads promoting colon cleansing, scientific studies have  
22 not shown that the commonly promoted pills and liquids have any health benefits.” (Attach. C at  
23 1.)

24 16. In fact, *The Miyagi Cohort Study* and *Basic Facts* suggest that frequent laxative use may  
25 *increase* the risk of colon cancer. (*See* Attach. A at 6, Watanabe et al., *supra*, at 2114; Attach. D.)  
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1 I declare under penalty of perjury that the foregoing is true and correct.

2 Executed this 6th of April, 2011, at Seattle, Washington.

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ISHAM M. REAVIS

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## Constipation, laxative use and risk of colorectal cancer: The Miyagi Cohort Study

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### Abstract

The objective of this study was to investigate the association between constipation or laxative use and the risk of colorectal cancer in Japanese men and women. In 1990, we delivered a self-administered questionnaire to 41 670 subjects who were 40–64 years old. During the seven years of follow-up, 251 incident cases of colorectal cancer were documented. Constipation was defined as a bowel movement frequency of less than daily. The multivariate relative risk (RR) of colorectal cancer for constipated subjects compared with those with daily bowel movements was 1.35 (95% Confidence Interval: 0.99–1.84). The RR for laxative users over non-users was 1.31 (0.88–1.95), and for frequent users (twice a week or more) it was 2.75 (1.48–5.09). When colorectal cancers were divided into colon cancers or rectal cancers, a significant association was found with colon cancer alone. Our results support the hypothesis that constipation or laxative use increases the risk of colon cancer.

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**Keywords:** Colorectal cancer; Constipation; Laxative use; Prospective cohort study

### 1. Introduction

The hypothesis that constipation or laxative use increases the risk of colorectal cancer has been controversial. Seven ecological studies of constipation have consistently found differences in faecal contents or bowel transit-time between high-risk and low-risk populations [1–7]. Twelve case-control studies have been conducted, and six of them found a positive association between constipation and the risk of colorectal cancer [8–19]. Moreover, a meta-analysis of nine case-control studies has shown a small, but significant, increase in risk associated with constipation [20]. By contrast, the results of the only prospective cohort study ever conducted did

not support an association between infrequent bowel movements and risk of colorectal cancer [21].

Eleven case-control studies of laxative use have been conducted, and five of them found a positive association between laxative use and risk of colorectal cancer [9,10,13–16,18,19,22–24]. Moreover, a meta-analysis of nine case-control studies showed a small, but significant, association [20]. By contrast, the findings in two prospective cohort studies have not supported an association between laxative use and the risk of colorectal cancer [21,25].

Most of the above studies had methodological limitations, including the use of a retrospective design [1–19,22–24] and failure to control sufficiently for potentially confounding variables, such as walking and food consumption [1–18,22–25]. Furthermore, few prospective studies have examined the association between constipation or laxative use and risk of colorectal cancer.

To further examine constipation or laxative use for an association with the risk of colorectal cancer, we

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conducted a population-based prospective cohort study in a rural area of Japan.

## 2. Patients and methods

### 2.1. Study cohort

We have reported the design of this prospective cohort study in detail elsewhere [26]. Briefly, between June and August 1990, we delivered a self-administered questionnaire to 51921 men and women who were 40–64 years old and living in 14 municipalities in Miyagi Prefecture in rural northern Japan. The questionnaires were delivered to, and collected at, subjects' residences by members of health promotion committees appointed by the municipal governments. The response rate to the questionnaire was 91.7% ( $n=47\,605$ ).

The study protocol was approved by the institutional review board of the Tohoku University Graduate School of Medicine. We considered the return of a questionnaire signed by a subject to imply the subject's consent to participate in the study.

### 2.2. Assessment of constipation and laxative use

The questionnaire asked about demographic variables, education, personal and family history of cancer and other diseases, health habits, including frequency of bowel movements, frequency of laxative use, smoking, alcohol consumption, diet, physical activity, and self-reported height and weight.

To assess constipation, a multiple-choice question about the frequency of bowel movements during the previous year asked the subject to choose from four possible answers: once or more often per day (referred to as "daily"), once every 2–3 days, once every 4–5 days, and once every 6 days or less often. Because relatively few subjects chose "once every 4–5 days ( $n=831$ )" or "once every 6 days or less often ( $n=122$ )", we combined these two categories into one "once every 4 days or less often". We defined "constipation" as having fewer than "daily" bowel movements.

To assess laxative use, a multiple-choice question asked about whether subjects used laxatives during the previous year, and gave the subject three possible answers: never, occasionally, and twice a week or more often. The questionnaire did not ask about specific types or brands of laxatives. We defined "laxative user" as a subject who chose answers other than "never".

### 2.3. Follow-up

We used the population registries of the 14 municipalities to determine the vital and residential status of

the subjects from June 1, 1990 through December 31, 1997. We identified incident cancer cases by computerised record linkage with the Miyagi Prefectural Cancer Registry covering the study area [27].

Of the 47 605 subjects who responded to the questionnaire, we excluded 914 subjects with a past history of cancer on the basis of self-report in the questionnaire or a record in the cancer registry. We also excluded 1840 subjects who did not respond to the question on bowel movement frequency as well as 3181 subjects who did not respond to the question on laxative use. Consequently, 41 670 subjects (20 044 men and 21 626 women) remained for the purpose of this analysis. During the seven years of follow-up, 251 incident cases of colorectal cancer were identified, of which 156 were colon cancer (103 men and 53 women) and 95 were rectal cancer (57 men and 38 women).

### 2.4. Statistical analysis

We counted person-years of follow-up for each subject from June 1, 1990 until the date of diagnosis of colorectal cancer, date of emigration outside the study district (because of logistical limitations), date of death, or the end of the study period (December 31, 1997), whichever occurred first. A total of 306 091 person-years accrued.

We used the Cox proportional-hazards regression to estimate the relative risk (RR) and 95% Confidence Interval (CI) of colorectal cancer according to the frequency of bowel movements and laxative use and to adjust for potentially confounding variables by using the PHREG procedure of the SAS version 8.2 statistical software package (Cary, NC, USA). In addition to gender and age, we considered the following variables as potential confounders: cigarettes smoking (never smoked, smoked in the past, currently smoking 1–19 cigarette per day, or currently smoking 20 or more cigarettes per day), alcohol consumption (never drank alcohol, drank in the past, currently drinking 22.7 g or less alcohol per day, or currently drinking 22.8 g or more alcohol per day), body mass index (BMI) in kg/m<sup>2</sup> (18.4 or lower, 18.5–24.9, 25.0 or higher), education (upto 15 years of age, from 16 to 18 years of age, or to 19 years or older), family history of colorectal cancer (presence or absence), consumption frequency of pork, green vegetables and orange (almost every day, 3–4 times per week, 1–2 times per week, 1–2 times per month, or rarely), daily walking time as a measure of non-occupational physical activity (60 min or more, 30–60 min, 30 min or less).

The "daily" category was used as the reference category to calculate the RRs associated with the frequency of bowel movements. "Every 2–3 days" and "every 4 days or less" were treated as separate categories, as well as the combined category "less than daily". To calculate

the RRs associated with laxative use, the “never” category was used as the reference category and referred to as “non-users”. “Occasionally” and “twice a week or more often” were treated as the combined category “laxative user” in addition to the separate categories designated “less than twice a week” and “twice or more often a week”, respectively.

To minimise any confusion between bowel habit change as a symptom of colorectal cancer and as a risk factor, we repeated all analyses after excluding colorectal cancer cases diagnosed in the first 3 years of follow-up ( $n=71$ ). All  $P$  values were two-tailed.

### 3. Results

Table 1 shows the number of men and women cross-classified by frequency of bowel movements and laxative use. Prevalence of constipation (defined as less than daily bowel movements) was higher among the women (31.8%) than among the men (11.9%). Prevalence of laxative use was also higher among the women (16.3%) than among the men (4.8%). Constipated men were more likely to use laxatives than men without constipation (14.2% and 3.5%, respectively), and constipated women were more likely to use laxatives than women without constipation (32.0% and 9.0%, respectively). Nevertheless, substantial proportions of both constipated men and women (85.8% and 68.0%, respectively) did not report the use of laxatives.

Table 2 shows several key characteristics of the men and women according to the frequency of bowel move-

ments and laxative use. Among the men, the constipated subjects were less likely to be obese, consume alcohol or walk. Laxative users were older, less likely to consume alcohol, walk or consume pork every day. Among the women, the constipated subjects were less likely to be obese, walk or consume vegetables every day. Laxative users were more likely to smoke and consume alcohol, but less likely to walk or consume pork every day.

Table 3 shows the RRs of colorectal cancer according to bowel movement frequency. We observed a modest increase in risk among subjects with constipation (less than daily bowel movements) compared with subjects without constipation (daily bowel movements), with the gender- and age-adjusted RR (95% CI) of 1.32 (0.97–1.80). We did not find a linear increase in risk associated with a lower frequency of bowel movement (trend  $P=0.16$ ), partly because of the small number of subjects with a very low bowel frequency (every 4 days or less). These results remained basically unchanged after multivariate adjustment of potential confounders and after the exclusion of colorectal cancer cases identified during the first three years of follow-up.

Table 3 also shows the RRs of colorectal cancer according to laxative use. We observed a modest increase in risk among laxative users compared with non-users, with the gender- and age-adjusted RR (95% CI) of 1.31 (0.88–1.95). We found a linear increase in risk associated with a higher frequency of laxative use (trend  $P=0.02$ ), with the gender- and age-adjusted RR (95% CI) of 2.76 (1.50–5.07) for subjects who used laxatives twice a week or more often. These results remained qualitatively similar after multivariate adjustment for potential confounders and after the exclusion of colorectal cancer cases diagnosed in the first three years of follow-up.

When the data for men and women were analysed separately, the multivariate RR (95% CI) for subjects with constipation compared with subjects without constipation was 1.24 (0.78–1.97) for men and 1.45 (0.94–2.22) for women. The multivariate RR (95% CI) for laxative users compared with non-users were 1.55 (0.87–2.76) for men and 1.18 (0.68–2.03) for women.

Table 4 shows the multivariate RRs for colon cancer and rectal cancer separately. We observed a higher risk associated with constipation and laxative use only for colon cancer and not for rectal cancer.

We conducted further analyses in which the presence or absence of constipation and laxative use were entered into the multivariate model simultaneously. The results were not altered materially, with multivariate RR (95% CI) of 1.32 (0.96–1.82) for constipation and 1.21 (0.80–1.82) for laxative use. We also divided subjects into four groups according to whether they were positive for constipation or laxative use, both, or neither. Compared with the subjects who were not constipated and did not use laxatives (30455 subjects including 186

Table 1  
Number of the subjects divided by bowel movement and use of laxatives

	Bowel movement frequency		
	Daily or more	Every 2–3 days	Every 4 days or less
<b>Men and women</b>			
<b>Laxative use</b>			
Non-user	30455	6290	437
<2 times/week	1555	1725	389
≥2 times/week	391	301	127
<b>Men</b>			
<b>Laxative use</b>			
Non-user	17038	1944	101
<2 times/week	524	237	44
≥2 times/week	99	46	11
<b>Women</b>			
<b>Laxative use</b>			
Non-user	13417	4346	336
<2 times/week	1031	1488	345
≥2 times/week	292	255	116

Table 2

Characteristics of the subjects according to bowel movement and use of laxative

Bowel movement	Men			Women		
	Daily or more	Every 2–3 days	Every 4 days or less	Daily or more	Every 2–3 days	Every 4 days or less
No. of subjects	17661	2227	156	14740	6089	797
Age (years), means $\pm$ SD	51.8 $\pm$ 7.6	51.0 $\pm$ 7.7	53.5 $\pm$ 7.7	52.8 $\pm$ 7.3	51.1 $\pm$ 7.5	50.1 $\pm$ 7.4
BMI in kg/m <sup>2</sup> $\geq$ 25.0 (%)	27.9	23.6	23.3	33.5	26.8	22.4
Current smoker (%)	61.2	62.9	61.5	8.5	9.6	16.9
Current drinker (%)	78.0	70.8	59.4	25.0	27.4	28.4
Education $\geq$ 19 year (%)	14.2	14.1	12.2	12.7	13.5	10.0
Family history of colorectal cancer (%)	1.5	1.3	1.7	1.5	1.7	1.5
Walking time >60 min/day (%)	460	41.0	29.7	47.8	41.2	38.8
Pork intake almost every day (%)	2.8	2.7	6.3	3.0	2.8	3.5
Vegetables intake almost every day (%)	20.8	16.3	19.5	28.6	22.6	21.2
Orange intake almost every day (%)	18.0	16.0	15.4	37.3	34.8	34.3
Use of laxative	Non-user			Non-user		
	<2 times/week	$\geq$ 2 times/week		<2 times/week	$\geq$ 2 times/week	
No. of subjects	19083	805	156	18099	2864	663
Age (years), means $\pm$ SD	51.5 $\pm$ 7.6	53.5 $\pm$ 7.6	54.5 $\pm$ 7.6	52.1 $\pm$ 7.4	51.6 $\pm$ 7.4	51.9 $\pm$ 7.2
BMI in kg/m <sup>2</sup> $\geq$ 25.0 (%)	27.6	25.0	31.1	30.8	33.3	29.4
Current smoker (%)	61.6	58.5	50.0	8.0	13.1	16.3
Current drinker (%)	77.7	67.1	50.9	24.9	29.2	32.8
Education $\geq$ 19 year (%)	14.5	15.3	15.8	12.8	11.9	19.6
Family history of colorectal cancer (%)	1.4	1.4	3.0	1.5	1.8	2.6
Walking time >60 min/day (%)	45.3	38.4	31.1	46.8	39.0	33.6
Pork intake almost every day (%)	6.1	2.4	0.7	3.0	2.3	3.3
Vegetables intake almost every day (%)	20.2	20.9	24.2	27.2	23.5	22.3
Orange intake almost every day (%)	17.7	18.7	24.0	36.9	34.9	34.1

SD, standard deviation; BMI, body mass index.

Table 3

Relative risk of colorectal cancer according to bowel movements and use of laxative

Bowel movement	Daily or more	Less than daily			P for trend
		Total	Every 2–3 days	Every 4 days or less	
No. of cases of colorectal cancer	196	55	52	3	
Person-years of follow-up	238106	67985	61064	6921	
Gender- and age-adjusted RR	1.00	1.32 (0.97–1.80)	1.38 (1.01–1.89)	0.77 (0.25–2.43)	0.16
P-value (versus daily or more)		0.07			
Multivariate RR 1	1.00	1.35 (0.99–1.84)	1.40 (1.02–1.93)	0.80 (0.25–2.51)	0.13
P-value (versus daily or more)		0.06			
Multivariate RR 2	1.00	1.30 (0.89–1.88)	1.38 (0.95–2.01)	0.38 (0.05–2.70)	0.38
P-value (versus daily or more)		0.17			
Use of laxative	Non-user	Laxative user			P for trend
		Total	<2 times/week	>2 times/week	
No. of cases of colorectal cancer	222	29	18	11	
Person-years of follow-up	273400	32691	26785	5906	
Gender- and age-adjusted RR	1.00	1.31 (0.88–1.95)	0.99 (0.61–1.62)	2.76 (1.50–5.07)	0.02
P-value (versus non-user)		0.18			
Multivariate RR 1	1.00	1.31 (0.88–1.95)	1.00 (0.61–1.63)	2.75 (1.48–5.09)	0.02
P-value (versus non-user)		0.18			
Multivariate RR 2	1.00	1.10 (0.67–1.80)	0.82 (0.44–1.52)	2.40 (1.11–5.18)	0.26
P-value (versus non-user)		0.72			

The multivariate relative risk (RR) has been adjusted for gender; age (in years); cigarettes smoking (never smoked, smoked in the past, currently smoking 1–19 cigarettes per day, or currently smoking 20 or more cigarettes per day); alcohol consumption (never drank alcohol, drank in the past, currently drinking 22.7 g or less alcohol per day, or currently drinking 22.8 g or more alcohol per day); body mass index in kg/m<sup>2</sup> (18.4 or lower, 18.5–24.9, or 25.0 or higher); education (upto 15 years of age, from 16 to 18 years, or 19 years or older); family history of colorectal cancer (presence or absence); pork intake (almost every day, 3–4 times/week, 1–2 times/week, 1–2 times/month, few); green vegetables intake (same as pork); orange intake (same as pork); walking time per day (60 min or more, 30–60 min, 30 min or less). RR2 denotes the RR excluding the case that were diagnosed in the first three years of follow-up. Values in parentheses are 95% CI.



Table 4  
Relative risk of colon cancer or rectal cancer alone according to bowel movements and use of laxative

Bowel movement	Colon cancer			Rectal cancer	
	Daily or more	Less than daily		Daily or more	Less than daily
No. of cases of colon cancer	120	36	No. of cases of rectal cancer	76	19
Gender- and age-adjusted RR	1.00	1.48 (1.01–2.18)	Gender- and age-adjusted RR	1.00	1.10 (0.65–1.84)
<i>P</i> -value ( <i>versus</i> daily or more)		0.05	<i>P</i> -value ( <i>versus</i> daily or more)		0.73
Multivariate RR	1.00	1.47 (1.00–2.17)	Multivariate RR	1.00	1.16 (0.69–1.95)
<i>P</i> -value ( <i>versus</i> daily or more)		0.05	<i>P</i> -value ( <i>versus</i> daily or more)		0.59
Laxative use	Laxative user			Laxative user	
	Non-user	Laxative user		Non-user	Laxative user
No. of cases of colon cancer	136	20	No. of cases of rectal cancer	86	9
Gender- and age-adjusted RR	1.00	1.52 (0.94–2.45)	Gender- and age-adjusted RR	1.00	1.00 (0.50–2.01)
<i>P</i> -value ( <i>versus</i> non-user)		0.09	<i>P</i> -value ( <i>versus</i> non-user)		1.00
Multivariate RR	1.00	1.48 (0.91–2.40)	Multivariate RR	1.00	1.04 (0.52–2.10)
<i>P</i> -value ( <i>versus</i> non-user)		0.11	<i>P</i> -value ( <i>versus</i> non-user)		0.91

The multivariate relative risk (RR) has been adjusted for gender; age (in years); laxative use frequency (never, less than 2 times/week, 2 times/week or more); cigarettes smoking (never smoked, smoked in the past, currently smoking 1–19 cigarettes per day, or currently smoking 20 or more cigarettes per day); alcohol consumption (never drank alcohol, drank in the past, currently drinking 22.7 g or less alcohol per day, or currently drinking 22.8 g or more alcohol per day); body mass index in kg/m<sup>2</sup> (18.4 or lower, 18.5–24.9, or 25.0 or higher); education (upto 15 years of age, from 16 to 18 years, or 19 years or older); family history of colorectal cancer (presence or absence); pork intake (almost every day, 3–4 times/week, 1–2 times/week, 1–2 times/month, few); green vegetables intake (same as pork); orange intake (same as pork); walking time per day (60 min or more, 30–60 min, 30 min or less). Values in parentheses are 95% CI.

colorectal cancer cases), the multivariate RRs (95% CI) for the subjects with constipation and non-users of laxatives (6727 including 36 cases), the subjects without constipation and users of laxatives (1946 including 10 cases), and the subjects who were constipated in spite of the use of laxatives (2542 including 19 cases) were 1.18 (0.82–1.70), 0.91 (0.48–1.73) and 1.85 (1.13–3.02), respectively.

#### 4. Discussion

The hypothesis that constipation increases the risk of colorectal cancer is based on evidence suggesting several possible mechanisms. First, bile acids [28,29], fecapentaene-12 [30] and ammonium acetate [31], present in faeces are reported to have cancer-promoting effects. Second, constipation causes bowel epithelial cells to come into contact with faeces for longer, and the significance of this contact with faeces has been demonstrated in several animal studies [32–34]. As the rectum is thought to be empty during constipation [35], this hypothesis may be more valid for colon cancer than for rectal cancer.

In this study, we found a modest, marginally significant, association between constipation and an increased risk of colon cancer. This is the first prospective cohort study on constipation and the risk of colorectal cancer to include both men and women. The Nurses' Health Study in the United States is the only other previous prospective study of bowel movement frequency and colorectal cancer [21]. That study followed 84 577 female nurses for 12 years and found no increase in the risk of

colorectal cancer, with a multivariate RR (95% CI) of 0.94 (0.69–1.28) for constipated women (having a bowel movement every 3 days or less often) compared with women with daily bowel movements. However, the results of the Nurses' Health Study did not necessarily exclude the possibility of a modest increase in risk, as suggested by the 95% CI of the RR.

Some ingredients of 'over-the-counter' laxatives have been reported to have cancer-promoting or -initiating activity in *in vitro* and *in vivo* experiments [36–39]. The results of our study are consistent with the findings of these laboratory experiments in showing an increased risk of colon cancer associated with laxative use. Two prospective studies have examined the association between laxative use and the risk of colorectal cancer. The first study [25] followed 11 888 Caucasian Americans for four and a half years and documented 126 cases of colorectal cancer. The RR (95% CI) for men and women who used laxatives daily compared with non-users was 1.32 (0.6–2.7) and 1.38 (0.7–2.6), respectively. The second study, the Nurses' Health Study [21], did not find any association and the multivariate RR (95% CI) was 1.00 (0.72–1.40) for women who used laxatives weekly to daily compared with non-users. The subjects of that study were all women, and our results are consistent with its findings that laxative use is not positively associated with an increased risk of colorectal cancer in women.

When assessing the associations between constipation, laxative use and risk of colorectal cancer, the temporal relationships among them must be taken into account in order to determine whether constipation is a symptom of the colorectal cancer or a cause of the

colorectal cancer. Case-control studies are particularly susceptible to this bias, because bowel movements and laxative use in the past were asked after case subjects had been diagnosed with colorectal cancer. We were able to minimise such bias by using a prospective study design, and by excluding the cancer cases identified during the first three years of follow-up.

Our study has two limitations. First, because the number of colorectal cancer cases was small, the increase in risk associated with constipation or laxative use was only of marginal statistical significance. Second, we did not specifically ask about the types or brands of laxatives used, although most laxatives exhibiting carcinogenic properties are irritant laxatives rather than bulk laxatives, lubricant laxatives or saline purgatives.

In conclusion, the findings in this population-based, prospective cohort study in middle-aged Japanese men and women support the hypothesis that constipation and laxative use increase the risk of colon cancer.

#### Conflict of interest

None.

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**LENGTH:** 2848 words

**TITLE:** The Role of Chronic Constipation, Diarrhea, and Laxative Use in the Etiology of Large-Bowel Cancer; Data from the Melbourne Colorectal Cancer Study

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**ABSTRACT:** Life-long bowel habits of 685 colorectal cancer cases and 723 age/sex frequency matched community controls were investigated as one part of a large, comprehensive, population-based study of colorectal cancer incidence, etiology, and survival, The Melbourne Colorectal Cancer Study. Self-reported chronic constipation was statistically significantly more common in cases than in controls ( $P = .05$ ). Three or more bowel actions per day were reported by more cases than controls but the total number of respondents in this subset consisted of only ten cases and two controls. Otherwise, the frequency and consistency of bowel motions was similarly distributed among cases and controls. Constipation disappeared as a significant risk when simultaneously adjusted for previously determined dietary risk factors, indicating that it is the diet and not the constipation that is associated with the risk of large-bowel cancer. Additionally, a highly statistically significant association ( $P = .02$ ) was found with the risk of colorectal cancer in those who reported constipation and also had a high fat intake, a finding consistent with current hypotheses of colorectal carcinogenesis. It is concluded that chronic constipation, diarrhea, and the frequency and consistency of bowel motions, as well as laxative use, are unlikely to be etiologic factors in the development of colorectal cancer. Self-reported chronic constipation is a marginally significant indicator of excess risk of large-bowel cancer and may be used as one of the indices in the screening of individuals for this cancer. [Key words: Colorectal cancer; Bowel habit; Constipation; Diarrhea; Laxatives; Etiology; Screening; Epidemiology]

**TEXT:**

THIS REPORT EXAMINES the associations between colorectal cancer and bowel habit in data drawn from a large, population-based study of large-bowel cancer incidence, etiology, and survival, The Melbourne Colorectal Cancer Study. [n1,n2] The main hypothesis tested in relation to bowel habit was that constipation (which may be an indicator of slow intestinal transit) is a risk factor in the subsequent development of colorectal cancer. [n3] A secondary hypothesis was that laxative use is a risk for colorectal cancer. [n4]

**Materials and Methods**

The data on bowel habit were drawn from the case control arm of the Melbourne Colorectal Cancer Study. [n1,n2] The case control study examined all the major current hypotheses of colorectal cancer risk, cause, and protection, including bowel habits.

The cases constituted all histologically confirmed new patients with colorectal adenocarcinoma diagnosed in the 12-month period between April 1980 and April 1981 who were usual residents of Metropolitan Melbourne, which had a population of 2.81 million at the time of the study. [n1,n2] Patients with a past history of ulcerative colitis or familial

B-1

Reavis Dec. Attachment B

polyposis (ten patients) were excluded from the case control study in order to examine a population that was likely to be a homogeneous etiologic entity. Community controls who were age/sex frequency matched with the cases were randomly selected from the same geographic area as the cases, according to a cluster sampling plan devised by the Australian Bureau of Statistics, the Government Agency responsible for the Australian Population Census, and other vital statistics. The demographic characteristics by age, sex, country of birth, and religion of both patients and controls (and of site and subsite for patients) not included in the study were analyzed in comparison with those included. [n1,n5,n6] It was concluded that selection/exclusion bias was not a significant factor [n1,n5,n6] and, for brevity, these data are not described again.

Two questionnaires were administered by personal interview. The first questionnaire contained data on age, sex, country of birth and religion, current and past illnesses, operations, medications, bowel habit and laxative use, psychosocial and stress factors, parity, and family history data. The second interview was the dietary questionnaire, which included questions on alcohol intake and tobacco use. In preliminary feasibility and pilot studies, [n1] it was difficult to gather accurate data on bowel habit, and several different approaches were tried before the final format of the questions was arrived at. This part of the interview was extensive and detailed and dealt with bowel habit over the entire adult life of the respondent regarding "constipation," "diarrhea," frequency and consistency of bowel motions, and laxative use. It was uniformly introduced by the interviewer in the following way: "Now I would like to ask you a few questions about your bowels." For patients only, the following sentence was then added: "The questions apply to *before* your present trouble started. First, I'd like to talk to you about constipation, by which I mean having trouble moving your bowels, or moving your bowels less frequently than usual, with smaller and harder motions than usual. I'm referring to before your *present* trouble started. Have you in your adult life been constipated, excluding when this occurs only once or twice a year or when you are on holidays?" For those who responded "yes" to this question, the following was then asked: "How often did this constipation occur, when did it first start and for how long did it last? Over the years, have you ever had bouts of diarrhea, that is, passed frequent watery motions which lasted longer than a week? I mean, apart from gastroenteritis or food poisoning episodes." The frequency of bowel actions was recorded and for bowel action consistency, all respondents were shown a card with four diagrams, labeled: 1 -- liquid; 2 -- does not hold shape, would form a mound; 3 -- holds shape, sausage shaped, firm; 4 -- small pellets, hard. In relation to laxative use, the following was asked, "In order to make your bowels move or for any other reason, have you ever taken laxatives more frequently than every month in your adult life?" For patients, the following was also added: "I am talking about taking laxatives *before* your present trouble started." It was pointed out in this question that the interviewer was talking about commercially produced laxatives and not the nutritional or home remedy types, such as bran, hot water, orange juice, etc.

The data analysis was made by unconditional logistic regression [n7] using the GLIM Statistical Package. [n8] The estimates of relative risk (RR) were tested for statistical significance expressed as chi square variable written  $\chi^2_{(n)}$  where n is the degrees of freedom (df). Cross tabulations were made using SPSSx. [n9]

## Results

In the case control study, there were 715 patients and 727 age/sex frequency matched controls. For the investigation of bowel habit, 22 metachronous colorectal cancers were excluded because these patients had had bowel resections in the past that may have altered their bowel habit. In eight further patients and in four controls, data on bowel habit were missing and these were also excluded. Thus, the analysis that follows refers to 685 cases and 723 controls. Among patients, there were 375 colon cancers and 310 rectal cancers. The age distribution for male patients, female patients, male controls, and female controls was remarkably similar to the mean age of the whole group, which was 65 years (standard deviation, 11).

**Self-Reported Bowel Habit:** Table 1 indicates the frequencies, relative risks and statistical significance of self-reported constipation, diarrhea, and laxative use. Chronic constipation episodes, as defined in the study, were reported by 215 patients (31 percent) and 191 controls (26 percent) and this difference was statistically significant ( $P = .05$ ). Further analysis of self-reported constipation indicated that there was a statistically significant excess of those reporting constipation among males, those who were less than 65 years old, and those who had colon cancer (Table 1). Episodes of self-reported diarrhea and the use of commercial laxatives were similarly distributed between patients and controls (Table 1).

TABLE 1. *Self-reported Constipation, Diarrhea, and Laxative Use*

[SEE ORIGINAL SOURCE]

Two previous studies of apparently healthy populations have found that at least 95 percent of adults have a bowel movement frequency of between three per day and three per week. [n10,n11] Thus, it was decided to analyze the data on self-reported frequency of bowel motions for the ten and 20 years prior to the interview in the three categories of less than three per week, between three per week and three per day, and more than three per day (Table 2). This showed that at least 95 percent of all cases and controls had between three bowel actions per week and three per day (Table 2). Among the small residual group of respondents who fell outside what may be considered as the "normal" number of bowel actions, there were more patients than controls who had less than three bowel actions per week and also more patients than controls who had more than three bowel actions per day (Table 2). This difference was not statistically significant for those having less than three bowel actions per week, but it was statistically significant for those having more than three bowel actions per day for both the previous ten and 20 years. It is emphasized that the total numbers in the subsets reporting more than three bowel actions per day were extremely small (12 patients and two controls for the previous ten years and ten patients and two controls for the previous 20 years). Self-reported consistency of bowel actions examined for the previous ten and 20 years showed no statistically significant differences between patients and controls (Table 3).

TABLE 2. *Self-reported Frequency of Bowel Actions*

[SEE ORIGINAL SOURCE]

TABLE 3. *Self-reported Consistency of Bowel Actions*

[SEE ORIGINAL SOURCE]

Constipation and Diet: A detailed examination was made of the association between self-reported constipation and previous diet. Several dietary factors already found to be statistically significantly associated with the risk of colorectal cancer in this study, which have been reported in detail elsewhere, [n12] were examined as potential confounding factors with self-reported constipation. These dietary factors were fiber/vegetable intake, cruciferous vegetable intake, dietary vitamin C intake, beef intake, fat intake, and milk intake (Table 4). This analysis showed that the risk of colorectal cancer is predominantly described by fiber/vegetable intake and cruciferous vegetable intake and not by constipation (Table 4). Table 4 also shows that dietary vitamin C, beef, and milk intake risks are independent of the constipation risk.

TABLE 4. *Statistical Significance of Constipation in Colorectal Cancer after Adjustment for Various Dietary Variables*

[SEE ORIGINAL SOURCE]

Examination of the fat intake factor with constipation was investigated in more detail by dividing the respondents into a low fat intake group (less than 100 gm per day) and high fat intake group (more than 100 gm per day). This analysis showed that there was a statistically significant positive interaction ( $P = .002$ ) between constipation and high fat intake, that is, the relative risk for those who reported constipation and had a high fat intake was higher than would be expected by the simple multiplicative effect of the two factors acting independently (Table 5).

TABLE 5. *Examination of Interactions in Risk of Colorectal Cancer With Fat Intake and Constipation*

[SEE ORIGINAL SOURCE]

In the dietary part of the Melbourne study, a model of dietary risk factors that were significantly associated with colorectal cancer risk [n12] ( $\chi^2_{[11]} = 212, P < .001$ ) was created. The risk factors in this model were: low intakes of dietary fiber/vegetables, cruciferous vegetables, dietary vitamin C, pork, fish, "other meats" (as defined in the study), vitamin supplements, low or high intake of milk drinks and high intakes of fat and, for males only, high intake of beer. Relative risks for those reporting constipation, when estimated by simultaneous adjustment for these dietary variables grouped together as a diet model, showed that the risk of constipation was confounded by the diet model and that the risk of colorectal cancer was predominantly described by that diet model rather than by self-reported constipation ( $\chi^2_{[1]} = 1, RR = 1.18, P = .3, CI = .91$  to 1.54).

## Discussion

There is relatively little data on what constitutes a "normal" number of bowel motions. A study by Connell and co-workers in 1965 [n10] in which enquiries were made about bowel habits of almost 1500 people who were either not

seeking medical advice or did not have known gastrointestinal disease showed that, in 99 percent, the frequency of bowel habit fell between three bowel actions per week and three per day. A more recent study from Australia, [n11] which examined the bowel habits of over 200 adults, also showed that about 95 percent of their respondents fell into this category. In the present study also, at least 96 percent of patients and 99 percent of the controls had between three bowel motions per week and three per day (Table 2).

The investigators had several methodologic difficulties with the interpretation of self-reported constipation, probably because the word "constipation" is interpreted in various ways by respondents despite the precise wording of the question in this study. This is reflected by 36 respondents (16 patients and 20 controls) who reported no constipation yet took laxatives in order to make their bowels move. Also, a further 52 respondents (27 patients and 25 controls) reported no constipation, took no laxatives, yet reported the presence of "hard motions." In another study of apparently healthy people, [n10] 4 percent reported constipation that, in some, correlated with infrequent bowel actions, in others with hardness of the stool, and often bore no relation to bowel frequency or stool consistency. A further difficulty in this study was the possible confounding of constipation as a presenting symptom of colorectal cancer. To overcome the problem of patients whose presenting symptom was constipation, the question was changed to determine how far back the symptoms went in time, that is, did the constipation appear before the development of their colorectal cancer. This question could not be resolved in some cases, and these were excluded from the analysis as self-reported constipation responses.

There have been six previous case control studies of colorectal cancer in which bowel habit was investigated. Three early studies in the 1960s found no differences in the frequency and severity of constipation, nor in the lifetime patterns of bowel movements. [n13-n15] In one of these studies, [n14] further analysis by subsites of the large bowel also did not show any statistically significant association between the location of the colorectal cancer and the degree of constipation. Three more recent case control studies that, *inter alia*, studied bowel habit in colorectal cancer [n16-n18] have had inconsistent findings. One found no statistically significant case control differences in bowel habit, [n17] one found that severe long-standing constipation was present statistically significantly more often in patients than in controls and that this difference applied to both colon cancer and rectal cancer cases, [n18] and the third study found a highly statistically significant difference in bowel habit in that patients reported diarrhea more frequently than controls. [n16] None of these previous case control studies made adjustments for diet as a confounding factor. More than three daily bowel actions were reported statistically significantly more often in patients than in controls in the present study, but as these findings involved only ten cases and two controls for the previous 20 years, no firm conclusions can be drawn. Apart from this finding the frequency and consistency of bowel motions were not associated with the risk of colorectal cancer in this study.

The frequency of regular laxative use in apparently well populations appears to be about 20 percent, having been found in 20 percent of the series of Connell and co-workers, [n10] 17 percent in the series of Dent and co-workers, [n11] 19 percent in the series of Wu and co-workers, [n19] and in 22 percent of the controls in the present study. Also, no statistically significant differences were found in any of the previous case control or cohort studies with respect to laxative use and colorectal cancer risk. [n14,n16,n19,n20] The Melbourne study also found no statistically significant difference in the distribution of laxative use among patients and controls. Based on currently available evidence, it appears most unlikely that laxative use is associated with colorectal cancer risk.

In this study, dietary habits were found to have an important confounding effect on constipation. A low intake of fiber, vegetables, and vitamin C-containing foods and a high intake of fat were each independently a confounding factor in self-reported constipation (Table 4). Of special interest was the finding that when the constipation risk was simultaneously adjusted for the entire dietary risk model, constipation disappeared as a risk factor in colorectal cancer (Table 4). This means that it is the dietary pattern and not the constipation that is associated with the risk of colorectal cancer. Of further interest in the present study was the finding that high fat intake and chronic constipation are highly statistically significantly associated with the risk of colorectal cancer (Table 5). This finding is consistent with the hypothesis that fat, with slow transit through the large bowel and increased degradation of secondary bile acids by bacteria, is one of the etiologic factors in the neoplastic transformation of the large-bowel epithelium. [n3,n21]

The authors conclude that chronic constipation is a marginal risk factor in colorectal cancer and is therefore of some value as an indicator of risk for screening purposes, but that it is significantly confounded by the dietary pattern of the individual and, in itself, is not an etiologic factor in colorectal cancer. It is also concluded that the frequency and consistency of bowel movements, as well as diarrhea and laxative use, are unlikely to be etiologic factors, nor are they likely to be associated with the risk of colorectal cancer.

**SUPPLEMENTARY INFORMATION:** From the University of Melbourne, Department of Surgery, Repatriation General Hospital, Heidelberg, Victoria, Australia

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## Publications

### Clean Your Colon Health or Hype?

Focused on Health - March 2010

By Mary Jane Schier

Ads promoting colon cleansing for everything from acid reflux to weight loss appear to be everywhere.

But prominent medical experts stress that no scientific proof has been published to support any of those claims.

"Colon cleansing has been around for a long time, yet no evidence exists that it prevents disease or improves health," says John R. Stroehlein, M.D., professor in M. D. Anderson's Department of Gastroenterology, Hepatology and Nutrition.

The one exception where cleansing the colon is essential involves preparation for a colonoscopy.

"The accuracy of examination by colonoscopy is highly dependent on the effectiveness of cleansing the bowel (see 'Ensure Success with Colonoscopy Prep').

"Otherwise, colon cleansing is not necessary and, in fact, may be harmful," Stroehlein says.

#### The remarkable colon

The colon is a crucial part of our gastrointestinal tract, which is very efficient in conserving fluids and electrolytes and storing waste for elimination.

All parts of the colon work together to rid the body of food waste and toxins.

"The colon is quite remarkable because it is uniquely designed to care for itself," Stroehlein says.

The average adult colon measures about 3 to 4 feet in length and 2.5 inches in width. This long muscular tube is constantly moving watery contents along its path to be eliminated after fluids and electrolytes are conserved.

One of the colon's priceless contributions is maintaining healthy bacteria content to protect our body from certain infections.

#### Myths about laxatives

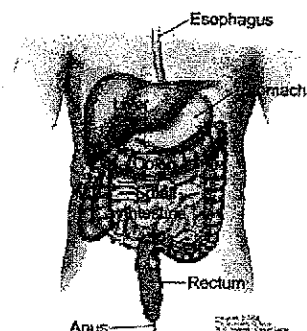
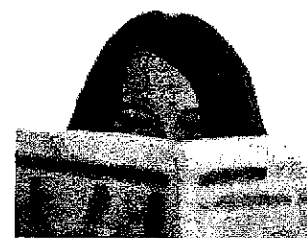


Although there are references to the ancient Egyptians using laxatives to get rid of bowel buildup, the popularity of colon cleansing has grown primarily in the last 25 years.

Today, colon cleansing products are touted for losing weight, treating acne, controlling acid reflux, increasing energy and a host of many other health problems.

"Some colon cleansing regimens contain laxatives or natural products with laxative properties, which can cause dehydration or loss of crucial electrolytes, such as sodium and potassium. These electrolytes are necessary for optimal function of nerves and muscles," Stroehlein explains, then adds:

"And some laxative products containing sodium phosphate have been reported to cause kidney damage."



stool."

Stroehlein notes the need to educate people about "the damaging effects of rapid weight loss induced by quickly getting rid of water and

#### The bottom line

Despite countless ads promoting colon cleansing, scientific studies have not shown that the commonly promoted pills and liquids have any health benefits.

Stroehlein is particularly concerned about claims that colon cleansing prevents colon cancer.

Countering that misconception, he says, "The important message is that appropriate screening with colonoscopy has been shown to reduce your chances of developing colon cancer by allowing the removal of pre-cancerous polyps."

"Interestingly, there is no proof that individuals who experience constipation have a higher incidence of colon cancer and absolutely no evidence that colon cleansing can prevent the disease," he stresses.

His advice for anyone considering a colon cleansing product: Consult your health care professional and also check out reputable medical websites.

"My take-home advice to help prevent colon cancer – and many other cancers – is to follow guidelines about periodic screening, particularly after age 50; eat a healthy diet with plenty of vegetables, fruits and fiber; get regular exercise; use alcohol in moderation; and definitely do not smoke," Stroehlein says.

Related Links:

Reavis Dec. Attachment C

C-1

<http://www.mdanderson.org/publications/focused-on-health/issues/2010-march/clean-your-c> 4/6/2011

[Colon Cancer \(M.D. Anderson\)](#)

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# Laxative Abuse: Some Basic Facts

## **What is laxative abuse?**

Laxative abuse occurs when a person attempts to get rid of unwanted calories, lose weight, “feel thin,” or “feel empty” through the repeated, frequent misuse of laxatives. Often, laxatives are misused following eating binges, when the individual mistakenly believes that the laxatives will work to rush food and calories through the gut and bowels before they can be absorbed. But that doesn’t really happen. Unfortunately, laxative abuse is **serious and dangerous** – often resulting in a variety of health complications and sometimes causing life-threatening risks.

## **What is the laxative myth?**

The belief that laxatives are effective for weight control is a myth. In fact, by the time laxatives act on the large intestine, most foods and calories have already been absorbed by the small intestine. Although laxatives artificially stimulate the large intestine to empty, the “weight loss” caused by a laxative-induced bowel movement contains little actual food, fat, or calories. Instead, laxative abuse causes the loss of water, minerals, electrolytes and indigestible fiber and wastes from the colon. This “water weight” returns as soon as the individual drinks any fluids and the body re-hydrates. If the chronic laxative abuser refuses to re-hydrate, she risks dehydration, which further taxes the organs and which may ultimately cause death.

## **Health consequences of laxative abuse:**

- ⇒ **Upset of electrolyte and mineral balances.** Sodium, potassium, magnesium, and phosphorus are electrolytes and minerals that are present in very specific amounts necessary for proper functioning of the nerves and muscles, including those of the colon and heart. Upsetting this delicate balance can cause improper functioning of these vital organs.
- ⇒ **Severe dehydration** may cause tremors, weakness, blurry vision, fainting, kidney damage, and, in extreme cases, death. Dehydration often requires medical treatment.
- ⇒ **Laxative dependency** occurs when the colon stops reacting to usual doses of laxatives so that larger and larger amounts of laxatives may be needed to produce bowel movements.
- ⇒ **Internal organ damage** may result, including stretched or “lazy” colon, colon infection, Irritable Bowel Syndrome, and, rarely, liver damage. Chronic laxative abuse may contribute to risk of colon cancer.

## **Stopping the laxative abuse cycle:**

Overcoming laxative abuse requires working with a team of health professionals who have expertise in treating eating disorders, including a general physician, a psychiatrist or psychologist, and a registered dietician. Support from close friends and family is also crucial. Meeting with others to talk over anxieties, concerns and difficulties can greatly aid in getting through tough times in the recovery process.



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